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IN 35 OF THE SOUTHWIDE PINE SEED SOURCE STUDY PLANTATIONS
DURING THE FIRST THREE YEARS

B. W. Henry and G. H. Hepting



SOUTHERN FOREST EXPERIMENT STATION
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B. W. Henry and G. H. Hepting²

Detailed data on the occurrence of diseases, insects, and other forms of damage have been taken at the end of each growing season for the first three years on 35 of the 57 Southwide Pine Seed Source Study³ plantations established during the winter of 1952-53. This southwide provenance study of longleaf, slash, loblolly, and shortleaf pines is a cooperative venture between Federal, State, and private interests aimed primarily at determining the zones within which seed may be moved freely from collecting grounds to planting site but across the boundaries of which seed should be moved cautiously, if at all. Details of the study and its establishment are available^{3, 4}. Detailed information on pest occurrence and damage is supplementary to the general object of the study. The present report deals only with disease and insect pests; the mention of seedling survival figures is made to clarify the pest situation. Means of making available salient information on the general object of the study as well as important excerpts of the pest implications are being developed. The next examination of the plantations is scheduled for the end of the fifth growing season.

The locations of the 35 plantations involved in this report and the seed sources, by States, are given in table 1. A plantation consisted of stock from several seed sources, with each source usually represented by four square plots of 121 seedlings each. The center 49 seedlings in

¹Field data on which this report is based were taken by pathologists and entomologists of the Southern and Southeastern Forest Experiment Stations, Forest Service, U. S. Department of Agriculture, in conjunction with the cooperators who installed and maintained the plantations.

²Respectively, Officer in Charge, Southern Institute of Forest Genetics, Southern Forest Experiment Station, and Chief, Division of Forest Disease Research, Southeastern Forest Experiment Station.

³Committee on Southern Forest Tree Improvement (Subcommittee on Geographic Source of Seed). Working Plan for Cooperative Study of Geographic Sources of Southern Pine Seed. 35 pp. September 12, 1952. [Processed.]

⁴Committee on Southern Forest Tree Improvement (Subcommittee on Geographic Source of Seed). Supplement No. 1 to the Original Working Plan of September 12, 1952, for the Southwide Pine Seed Source Study. 110 pp. May 22, 1956. [Processed.]

Table 1.--Sources of seed and locations of plantations, by States

States	Loblolly		Slash		Longleaf		Shortleaf	
	Seed collection areas	Plantations studied	Seed collection areas	Plantations studied	Seed collection areas	Plantations studied	Seed collection areas	Plantations studied
	No.	No.	No.	No.	No.	No.	No.	No.
New Jersey	0	0	0	0	0	0	1	0
Pennsylvania	0	0	0	0	0	0	1	0
Maryland	1	0	0	0	0	0	0	0
North Carolina	2	2	0	1	2	1	0	0
South Carolina	1	1	1	1	2	2	1	1
Georgia	3	3	0	0	1	1	1	1
Florida	0	0	2	2	2	1	0	0
Alabama	3	2	1	1	1	0	1	1
Mississippi	1	2	1	1	0	1	2	1
Louisiana	1	2	1	1	2	0	1	1
Texas	1	0	0	0	1	0	1	0
Oklahoma	0	0	0	0	0	0	1	0
Arkansas	1	0	0	0	0	0	3	2
Tennessee	1	1	0	0	0	0	1	2
Missouri	0	0	0	0	0	0	1	0
Totals	15	13	6	7	11	6	15	9

each plot were individually examined at the end of each of the three growing seasons. The seedlings were healthy 1-0 stock when planted. Percentages of infestation given throughout this report are based on living seedlings plus those that were killed by the particular pest under discussion.

LOBLOLLY PINE

Thirteen plantations and 15 seed sources were represented.

Survival was in general satisfactory, with 75 percent or more of the seedlings alive at the end of the third year in 7 of the 13 plantations. Poorest survival was in the Tennessee plantation, with 30 to 60 percent alive after 3 years. All but a very small amount of the seedling mortality occurred the first year and was attributed mostly to drought.

Nantucket tip moth (Rhyacionia frustrana Comst.) was the predominant insect pest of loblolly pine. All plantations were infested. In general, infestation was light the first year, built up rapidly the second, and leveled off or became heavier the third. Exceptions were the North

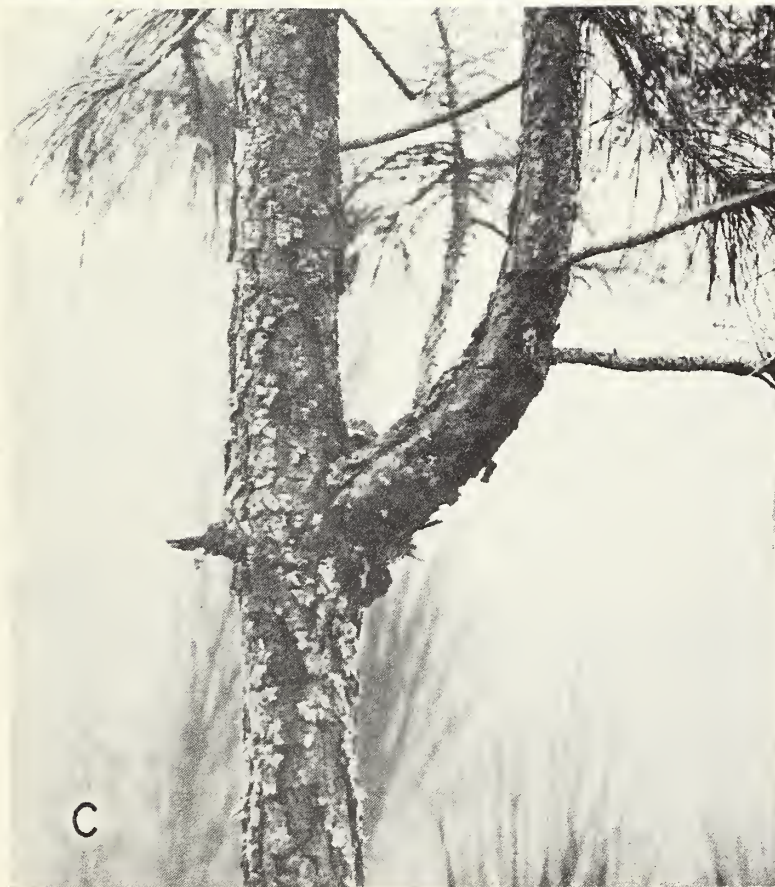


Figure 1.--A: Pine webworm damage to foliage. B: Tipmoth larva in bud. C: Fusiform rust canker entering stem from branch.

Carolina and one of the Alabama plantations, where infestation was lighter the third than it was the second year. Heaviest attacks were in the South Carolina and one of the Georgia plantations, where 100 percent of the live seedlings were attacked the third year. Mortality from tip moth was negligible but the terminal bud or shoot of attacked seedlings was generally killed. While the effects on growth and form have yet to be determined, there are indications of growth reduction following heavy attack.

Fusiform rust (Cronartium fusiforme Hedgc. and Hunt) occurrence varied greatly. The ranges of infection among seed sources after 3 years were: in the Tennessee plantation, 0 percent; the 2 North Carolina plantations, 1 to 12 and 1 to 11 percent; the South Carolina plantation, 0 to 3 percent; the 3 Georgia plantations, 0 to 2, 0 to 2, and 3 to 14 percent; the 2 Alabama plantations, 5 to 10, and 18 to 77 percent; the 2 Mississippi plantations, 1 to 9 and 0 to 15 percent; and the 2 Louisiana plantations, 1 to 23 and 11 to 47 percent. There appeared to be differences in susceptibility among the seed sources. These data will be analyzed and the results published later.

Most of the rust cankers on these young seedlings were already in the stems or likely soon to enter them from the infected branches, so that the presently infected trees will probably die or be permanently deformed before reaching merchantable size. Many infected seedlings had died by the end of the third year. Since the percentage of trees infected is rapidly increasing in many plantations and is already high on some seed sources, this disease probably will eventually cause major losses in certain instances.

Needle blight was widespread in occurrence but variable in intensity. Indications of possible relation to seed sources were not noted. In most cases where the cause was identified it was the brown spot fungus, Scirrhia acicola (Dearn.) Siggers, which has only recently been recognized as a loblolly problem. Hypoderma lethale Dearn. was also involved in some of the needle blighting. Some growth loss probably results from the needle killing but at present no reliable measure is available.

Pine webworm (Tetralopha robustella Zell.) was omnipresent with 15 to 20 percent of the seedlings in some plantations infested by the end of the first year. In general, infestation was lighter the second year and still less or absent the third. No mortality was attributed to this insect and no measure of the growth loss is available.

Other pests, which attacked occasional trees but were negligible in overall effect, included needle rust, pales weevil, aphids, scale insects, pitch midge, and the red-headed sawfly.

SLASH PINE

Seven plantations and 6 seed sources were represented.

Survival varied greatly between plantations. By the end of the third year the extremes were 79 to 91 percent (depending upon the seed source) in Mississippi and 1 to 18 percent in North Carolina. In general, survival was over 50 percent. Almost all seedling mortality occurred the first year and was attributed mostly to drought.

Pine webworm was present in all plantations, with the highest infestation being 12 to 24 percent in the Louisiana one at the end of the first year. Infestation generally lessened the second and third years. No seedling mortality was attributed to this insect and no measure of the effect on growth is available.

Fusiform rust was found in all but the North Carolina plantation, with the range of infection among seed sources by the end of the third year being: South Carolina, 8 to 14 percent; north Florida, 0 to 4 percent; central Florida, 0 to 1 percent; Alabama, 2 to 11 percent; Mississippi, 7 to 18 percent; and Louisiana, 36 to 50 percent. Data on the amount of rust by seed sources will be analyzed for possible significant differences and published later.

Since the percentage of trees infected in the heaviest hit plantations (South Carolina, Alabama, Mississippi, and Louisiana) was much greater the third than the second year and young infected trees are likely to be rust-killed or permanently deformed, the statement made earlier regarding probable losses in loblolly pine applies equally here.

Other pests that were occasionally encountered but believed to be negligible in overall effect were the needle rust and needle blight diseases, and the pales weevil, red-headed sawfly, Nantucket tip moth, and a Pityophthorus bark beetle among the insects.

LONGLEAF PINE

Six plantations and 11 seed sources were represented.

Survival ranges by seed sources in the plantations at the end of the third year were: North Carolina, 23 to 56 percent; South Carolina (2 plantations), 15 to 42 percent and 11 to 22 percent; Georgia, 75 to 89 percent; Florida, 52 to 84 percent; and Mississippi, 51 to 85 percent. Nearly all seedling mortality occurred the first year and was attributed mostly to drought.

Brown spot needle blight was present in variable amounts in all the plantations examined. The working plan for the study³ called for the application of a fungicide when necessary to control this disease on longleaf pine. Since the spray schedules actually followed by the co-operators are not known, the brown spot figures are omitted here as being meaningless for comparative purposes.

Pine webworm was generally present but light in intensity.

Other pests that were found occasionally were the needle rust disease, and the red-headed sawfly and a Pityophthorus bark beetle among the insects.

SHORTLEAF PINE

Nine plantations and 15 seed sources were represented.

Survival by seed sources at the end of the third year was within the range of 30 to 70 percent in the Georgia and the 2 Arkansas plantations, and 60 to 95 percent in the other 6 plantations except for the Louisiana seed source in the Tennessee plantation, which had a 32-percent survival. Most seedling mortality occurred during the first year, and was attributed largely to drought.

Nantucket tip moth was present in all plantations. As with loblolly pine, infestation in general was light the first year and built up rapidly the second and third years. Intensity the third year varied by seed sources, from 10 to 15 percent of the seedlings infested in the Alabama plantation to 43 to 80 percent in the Mississippi planting. No mortality of shortleaf was attributed to tip moth, but the effects on growth and form have yet to be determined.

Other pests occasionally reported but apparently causing minor damage during the three years were the needle blight and needle rust diseases, and the pine webworm, pales weevil, and red-headed sawfly among the insects.

SUMMARY

A brief resume' is given of the status of disease and insect pests for the first 3 years after establishment of 13 loblolly, 7 slash, 6 longleaf, and 9 shortleaf pine plantations from North Carolina to Louisiana. Fifteen loblolly pine seed sources, 6 slash, 11 longleaf, and 15 shortleaf are represented. Accumulation of such detailed pest information is a supplemental phase of the Southwide Pine Seed Source Study.

Most of the mortality for the first 3 years occurred the first year and was attributed largely to drought.

The fusiform rust disease was building up rapidly in intensity by the end of the third year in many of the loblolly and slash pine plantings and may be expected to cause considerable damage. There were strong indications of differences in susceptibility between seed sources of loblolly pine.

Attack by the Nantucket tip moth was general in the loblolly and shortleaf plantings and usually involved the terminal bud. There are indications that it may be causing appreciable retardation of height growth. There were no indications of differences in susceptibility between seed sources.

Brown spot needle disease was common on longleaf pine but because of scheduled control with fungicides it should not be a damaging factor. This disease and Hypoderma needle blight also occurred on loblolly pine, where they are not being controlled, and may be causing some growth loss.

The pine webworm was recorded in all plantations of all species except the North Carolina and one South Carolina longleaf plantings. Attacks were light in general and decreased in intensity over the 3 years.

Other pests found occasionally in minor quantities were the needle blight and needle rust diseases, pales weevil, red-headed sawfly, Pityophthorus bark beetle, aphids, pitch midges, and scale insects.

